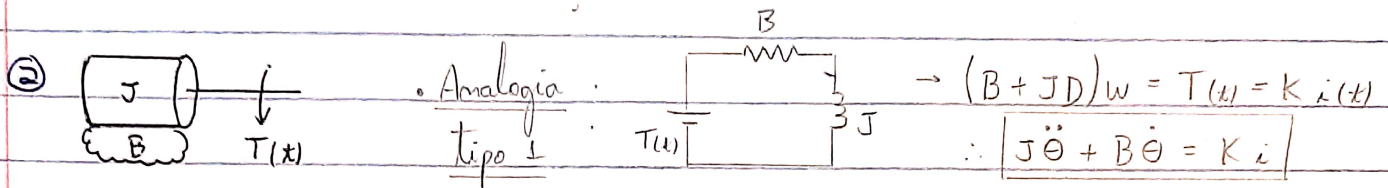
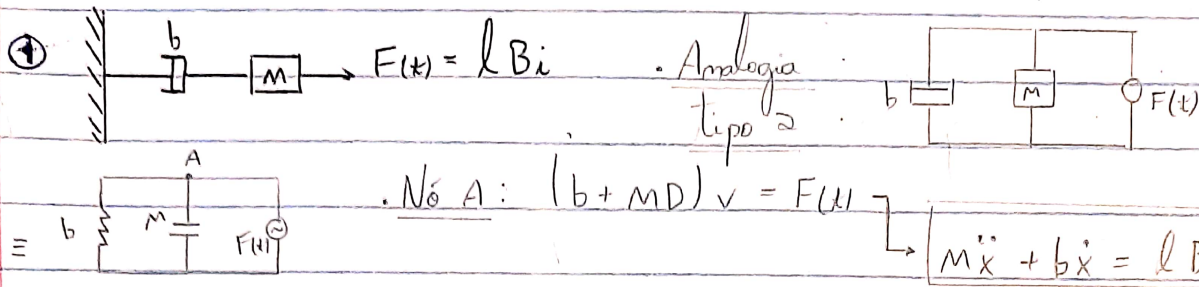


Gabriel Barbosa Pagarini - 10772539 - Modelagem ex. 10/09



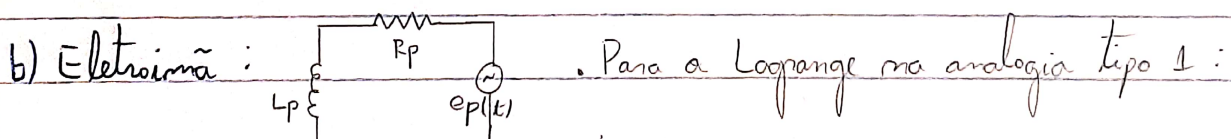
• Per Lagrange:  $T = \frac{J\dot{w}^2}{2} + \frac{La \dot{ia}^2}{2} = \frac{J\dot{\theta}^2}{2} + \frac{La \dot{ga}^2}{2} \quad / \quad \dot{v}=0 \quad / \quad R = \frac{B\dot{\theta}^2}{2} + \frac{Ra \dot{ga}^2}{2}$

•  $\theta$ :  $\frac{\partial L}{\partial \theta} = J\dot{\theta} \rightarrow \frac{d}{dt} \left( \frac{\partial L}{\partial \dot{\theta}} \right) = J\ddot{\theta}$ ;  $\frac{\partial L}{\partial \theta} = 0$ ;  $\frac{\partial R}{\partial \dot{\theta}} = B\dot{\theta}$ ;  $T(t) = K \dot{ga}$

$\therefore J\ddot{\theta} + B\dot{\theta} = T(t) \rightarrow J\ddot{\theta} + B\dot{\theta} = K \dot{ga}$

•  $ga$ :  $\frac{\partial L}{\partial ga} = La \dot{ga} \rightarrow \frac{d}{dt} \left( \frac{\partial L}{\partial \dot{ga}} \right) = La \ddot{ga}$ ;  $\frac{\partial L}{\partial ga} = 0$ ;  $\frac{\partial R}{\partial \dot{ga}} = Ra \dot{ga}$

$\therefore La \ddot{ga} + Ra \dot{ga} = ea(t) - eb(t) \rightarrow La \ddot{ga} + Ra \dot{ga} = ea(t) - Kb \dot{\theta}$



$T = \frac{J\dot{\theta}^2}{2} + \frac{Lp \dot{gp}^2}{2} \quad / \quad v=0 \quad / \quad R = \frac{B\dot{\theta}^2}{2} + \frac{Rp \dot{gp}^2}{2} \quad / \quad T(t) = K ip = K \dot{gp}$

•  $\theta$ :  $\frac{d}{dt} \left( \frac{\partial L}{\partial \dot{\theta}} \right) = J\ddot{\theta}$ ;  $\frac{\partial L}{\partial \theta} = 0$ ;  $\frac{\partial R}{\partial \dot{\theta}} = B\dot{\theta}$  }  $J\ddot{\theta} + B\dot{\theta} = K \dot{gp}$

•  $gp$ :  $\frac{d}{dt} \left( \frac{\partial L}{\partial \dot{gp}} \right) = Lp \ddot{gp}$ ;  $\frac{\partial L}{\partial gp} = 0$ ;  $\frac{\partial R}{\partial \dot{gp}} = Rp \dot{gp}$  }  $Lp \ddot{gp} + Rp \dot{gp} = ep(t)$